

CLAIMS

We claim:

1. A electronic imaging component, said component comprising:
an electronics layer;
a photosensing element, said photosensing element fabricated in a vertically
integrated optically active layer;
a substantially vertical interconnect;
said photosensing element further comprising a junction surrounding and at
least partially encompassing said vertical interconnect, wherein charge
carriers may be substantially laterally drawn toward the axis of at least
one of said junction and said interconnect;
said optically active layer bonded to said electronics layer; and
said optically active layer positionally disposed proximate to a metalization
surface of said electronics layer.
2. The imaging component of claim 1, wherein said electronics layer is
substantially fully processed.
3. The imaging component of claim 1, wherein said photosensing element
comprises at least one of a photodiode, a photomultiplier, a
phototransistor, and a photoconductor.
4. The imaging component of claim 1, wherein said optically active layer
comprises at least one of Si, GaAs, InP, GaN, HgCdTe, a-Si, p-Si, x-

Si, Ge, SiGe, SiC, a monocrystalline material, a polycrystalline material and an amorphous material.

5. The imaging component of claim 1, wherein said bonding comprises at least one of wafer-to-wafer bonding and die-to-wafer bonding.
6. The imaging component of claim 1, wherein said interconnect comprises at least one of a metallized via, an electrical conductor, p-Si and a semiconductor; and
said interconnect extends substantially through said optically active layer.

- 7.** An electronic imaging component array, said component array comprising:
- an electronics array layer;
 - a photosensing element array, said photosensing element array fabricated in
 - a vertically integrated optically active layer;
 - a plurality of substantially vertical interconnects;
- said photosensing element array further comprising a plurality of junctions
- substantially surrounding and at least partially encompassing said plurality of vertical interconnects, wherein charge carriers may be substantially laterally drawn toward the axes of at least one of said plurality of junctions and said plurality of interconnects;
- said optically active layer bonded to said electronics array layer; and
- said optically active layer positionally disposed proximate to a metalization surface of said electronics array layer.
- 8.** The imaging component array of claim **7** having a relatively high interconnect density.
- 9.** The imaging component array of claim **8**, wherein said high interconnect density comprises about one connection per up to about 10-250 square microns.
- 10.** The imaging component array of claim **7**, wherein said interconnects comprise a plurality of at least one of metallized vias, electrical conductors, p-Si and semiconductors.

11. The imaging component array of claim 7, wherein the photosensing element fill factor is up to about 75%.
12. The imaging component array of claim 7, wherein the photosensing element fill factor is greater than 75%.
13. The imaging component array of claim 12, wherein the photosensing element fill factor is up to about 100%.
14. The imaging component array of claim 7, wherein the electronics circuitry is optimized for substantial parallel processing of array-captured images.
15. The imaging component array of claim 7, further comprising a plurality of vertically integrated optically active layers.
16. The imaging component array of claim 7, further comprising a plurality of vertically integrated electronic processing layers.
17. The imaging component array of claim 7, wherein said optically active, monocrystalline layer comprises at least one of Si, GaAs, InP, GaN, HgCdTe, a-Si, p-Si, x-Si, Ge, SiGe, SiC, a monocrystalline material, a polycrystalline material, and an amorphous material.

- 18.** A electronic imaging component array, said component array comprising:
a plurality of electronics array layers;
a plurality of photosensing element arrays, said photosensing element arrays
fabricated in a plurality of vertically integrated optically active layers;
a plurality of substantially vertical interconnects;
said photosensing element arrays further comprising a plurality of junctions
substantially surrounding and at least partially encompassing said
plurality of vertical interconnects, wherein charge carriers may be
substantially laterally drawn to the axes of at least one of said plurality
of junctions and said plurality of interconnects;
said optically active layers bonded to said electronics layers; and
said optically active layers positionally disposed proximate to a metalization
surface of said electronics layers.
- 19.** The imaging component array of claim **18**, wherein different optically
active layers are suitably adapted to demonstrate sensitivity to
different regions of the electromagnetic spectrum.
- 20.** The imaging component array of claim **18**, wherein said optically active,
monocrystalline layers comprise at least one of Si, GaAs, InP, GaN,
HgCdTe, a-Si, p-Si, x-Si, Ge, SiGe, SiC, a monocrystalline material, a
polycrystalline material, and an amorphous material.